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# PATENT SPECIFICATION

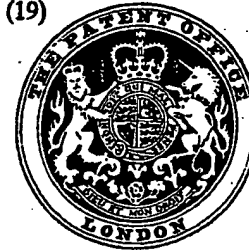
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## (54) METHOD OF PROTECTING DISC BRAKES FROM RUST

(71) We, FORD MOTOR COMPANY LIMITED, of Eagle Way, Brentwood, Essex CM13 3BW, a British Company, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of inhibiting rusting of parts of a vehicle wheel braking arrangement, which arrangement includes a rotatable brake disc, a disc shield adjacent one face of the brake disc, a hub rotatable with the disc and carrying a wheel-receiving flange disposed facing the other face of the brake disc, and a caliper arrangement for clamping and thus braking the disc. It has been found that when a vehicle having a braking arrangement as described above is driven, rusting can occur on the disc and sometimes also on the caliper arrangement. Thus, when the vehicle is subsequently driven, the brake will not operate efficiently and/or the brakes will be noisy in operation. The invention also relates to a cover for use in performing of the invention.

According to one aspect of the invention, there is provided a method of inhibiting rusting of parts of a vehicle wheel braking arrangement, which arrangement includes a rotatable brake disc, a disc shield adjacent one face of the brake disc, a hub rotatable with the disc and carrying a wheel receiving flange disposed facing the other face of the brake disc, and a caliper arrangement for clamping and thus braking the disc, the method including the steps of providing a cover comprising a sheet of material having a central aperture and an inturned flange which overlies the edge of the sheet to define a pocket between the sheet and its flange, the method further comprising the step

of placing the cover onto the said braking arrangement with the wheel flange passed through the central aperture and the sheet lying around the hub between the wheel receiving flange on the one hand and the brake disc and caliper arrangement on the other hand, the inturned flange of the cover being disposed adjacent that face of the sheet remote from the wheel receiving flange and being placed over the disc shield to overlie a rear face of the shield remote from the disc and thus retain the cover in place, with the caliper arrangement and the rims of the disc and of the disc shield lying in the said pocket defined between the sheet and the inturned flange, a substance which serves to give off a rust inhibiting vapour being disposed in such a position that the said vapour lies on the space between the disc shield and the sheet of the cover.

In order that the invention may be more readily understood, a method of inhibiting rusting according to the invention and a cover and chemical carrying sheet for use in performing the method will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a perspective view showing a braking arrangement to be protected against rusting and showing a carrier sheet and cover to be placed on the braking arrangement.

Figure 2 is a view similar to Figure 1, but showing the carrier sheet and cover (in broken lines) disposed in position on the braking arrangement; and

Figure 3 is a view showing (in full lines) the cover in position on the braking arrangement.

Figure 1 shows an assembly 1 including a wheel hub and a disc brake arrangement, a sheet of paper 2 impregnated with chemicals, and a cover 3 made of a plastics

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material. The sheet 2 and cover 3 are to be fixed in place on the assembly 1 to provide protection against rusting as will be explained below, and the sheet 2 and cover 3 are shown aligned with the assembly 1 in the correct positions ready to be fixed on to the assembly 1.

The assembly 1 is well known and does not require detailed explanation. Briefly the assembly comprises a wheel hub 4 rotatable about a stud 5 to which it is secured by a nut 6 and split pin 7. The hub 4 has a wheel receiving flange 8 onto which a wheel is to be bolted, and four studs 9 are provided to receive wheel nuts (not shown). Rotatable with the hub is a disc 10 which is protected by a non-rotatable disc shield 11. A caliper arrangement 12 is provided for clamping the disc 10 to provide a brake. The stud 5 on which the hub is rotatable is carried by a member 13 of the vehicle.

The sheet 2 is square and is provided with a central circular opening 14 from which extend two radial slits 15 disposed diametrically opposite one another. The sheet 2 serves as a carrier for chemicals which impregnate the sheet 2 and which give off a vapour which prevents rusting. The chemicals are well known and are described in British patent specification No. 728,634.

The cover 3 is made of a plastics material and is thus not porous to the vapour given off from the sheet 2. The cover 3 is made from two sheets 16 and 17 which are circular and welded together by a seam 18 extending around the periphery of the cover. The sheet 16 has a central aperture 19 which is generally oval in shape, but has four straight sides joined by curved portions. The sheet 17 has a much larger central aperture 20 which is generally D-shaped. The aperture 20 has one straight side 21 which extends parallel to the longitudinal axis of the aperture 18 in sheet 16, which axis passes through the two smaller radius curves of the aperture 19.

The manner in which the sheet 2 and cover 3 are secured in place on the assembly 1 will now be described with reference to Figures 2 and 3.

The sheet 2 is placed on the central portion of the hub 4, the wheel flange 8 passing through the central opening 14. The outer diameter of the wheel flange 8 is of course larger than the diameter of the opening 14, but the provision of the slits 15 enables the sheet 2 to be manoeuvred over the flange 8. The slits 15 will close when the sheet 2 is in position on the hub, because the diameter of the part of the hub 4 on which the sheet lies is about the same as the diameter of opening 14.

The four corners of the square sheet 2 are folded over behind the disc shield 11. In this position the sheet 2 is in contact with the caliper arrangement 12, and may also contact a part of the edge of the disc 10.

The cover 3 is then manoeuvred into the position illustrated in Figure 3. This is achieved by manoeuvring the cover 3 so that the flange 8 passes through the central apertures 20 and 19.

The sheet 16 of cover 3 then lies around the hub 4, and is disposed between the flange 8, and the disc 10 and its shield 11. The sheet 17 serves as an intumed flange of the cover which extends from the sheet 16 and overlies the edge of the sheet 16 to define a pocket. The flange formed by the sheet 17 is of course disposed opposite that face of the sheet 16 which is remote from the wheel receiving flange 8. The flange formed by the sheet 17 is then placed over the disc shield 11 to overlie the rear face of the shield. The cover 3 is thus retained in its position shown in Figure 3, with the caliper arrangement 16 and the rims of the disc 10 and shield 11 lying in the pocket defined between the flange forming sheet 17 and the sheet 16.

The cover 3 serves to hold the carrier sheet 2 in place, and since the cover is impervious, it tends to retain the vapour given off by the carrier sheet 2 in the space between the shield 11 and sheet 16 of the sleeve. The vapour thus inhibits rusting of the disc 10 and caliper arrangement 12.

In the arrangement illustrated the shield 11 is interrupted to expose the rear face of the caliper arrangement 12. It will be noted that the caliper arrangement 12 is enclosed by a larger sized flange portion 22 which extends closer to the centre of the sleeve than the remainder of the flange forming sheet 17.

It will be appreciated that it is intended that the cover 3 and carrier 2 should be removed before the vehicle is supplied to the customer. However, the carrier sheet 2 and cover 3 do not prevent light use of the brakes so that the vehicle can be driven short distances. Heavy use of the brakes might cause melting of the cover 3, but even in this case the brakes may still be effective.

In an alternative arrangement the carrier sheet 2 and cover 3 could be combined in any suitable way to form a single unit. This might be achieved by providing the sheet 2 with a flange to engage the back of shield 11, or by making the cover 3 serve to carry the vapour evolving substance.

#### WHAT WE CLAIM IS:—

1. A method of inhibiting rusting of parts of a vehicle wheel braking arrange-

- ment, which arrangement includes a rotatable brake disc, a disc shield adjacent one face of the brake disc, a hub rotatable with the disc and carrying a wheel receiving flange disposed facing the other face of the brake disc, and a caliper arrangement for clamping and thus braking the disc, the method including the steps of providing a cover comprising a sheet of material having a central aperture and an intumed flange which overlies the edge of the sheet to define a pocket between the sheet and its flange, the method further comprising the step of placing the cover onto the said braking arrangement with the wheel flange passed through the central aperture and the sheet lying around the hub between the wheel receiving flange on the one hand and the brake disc and caliper arrangement on the other hand, the intumed flange of the cover being disposed adjacent that face of the sheet remote from the wheel receiving flange and being placed over the disc shield to overlie a rear face of the shield remote from the disc and to thus retain the cover in place, with the caliper arrangement and the rims of the disc and of the disc shield lying in the said pocket defined between the sheet and the intumed flange, a substance which serves to give off a rust inhibiting vapour being disposed in such a position that the said vapour lies in the space between the disc shield and the sheet of the cover.
2. A method according to Claim 1, and including the step of positioning the cover so that a larger sized part of the intumed flange which extends further towards the centre of the cover than the remainder of the flange is disposed around the said caliper arrangement.
3. A method according to Claim 1 or Claim 2, and including the steps of, prior to placing the cover in position, placing a carrier sheet (which serves to carry the said vapour evolving substance) having a central opening onto the hub between the wheel receiving flange on the one hand and the disc and caliper arrangement on the other hand, and of bending edge portions of the carrier sheet over to overlie the face of the disc shield remote from the disc, whereby the step of placing the cover in position serves to hold the carrier sheet in position.
4. A method of inhibiting rusting of parts of a vehicle wheel braking equipment substantially as hereinbefore described with reference to the accompanying drawings.
5. A cover for use in performing the method claimed in Claim 1, such cover comprising a sheet of material having a central aperture and an intumed flange which overlies the edge of the sheet to define a pocket between the sheet and flange, the cover being made of a plastics material and the flange being formed by a second sheet of plastics material welded to the first sheet and having an aperture therein of larger size than the said central aperture in the sheet, the aperture in the said second sheet being D-shaped, and the aperture in the first sheet being generally oval.
6. A cover according to Claim 5, wherein a straight side of the D-shaped aperture in the second sheet extends parallel to the longitudinal axis of the generally oval aperture in the first sheet.
7. A cover substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
8. In combination with a cover according to any one of Claims 5 to 7, a carrier sheet which is impregnated with a substance which evolves a rust inhibiting vapour, the carrier sheet being square in shape and having a central opening from which a radial slit extends.
9. A cover according to Claim 5 wherein the said sheet of the sleeve serves as a carrier for a substance which evolves a rust inhibiting vapour.
- PETER ORTON  
Chartered Patent Agent

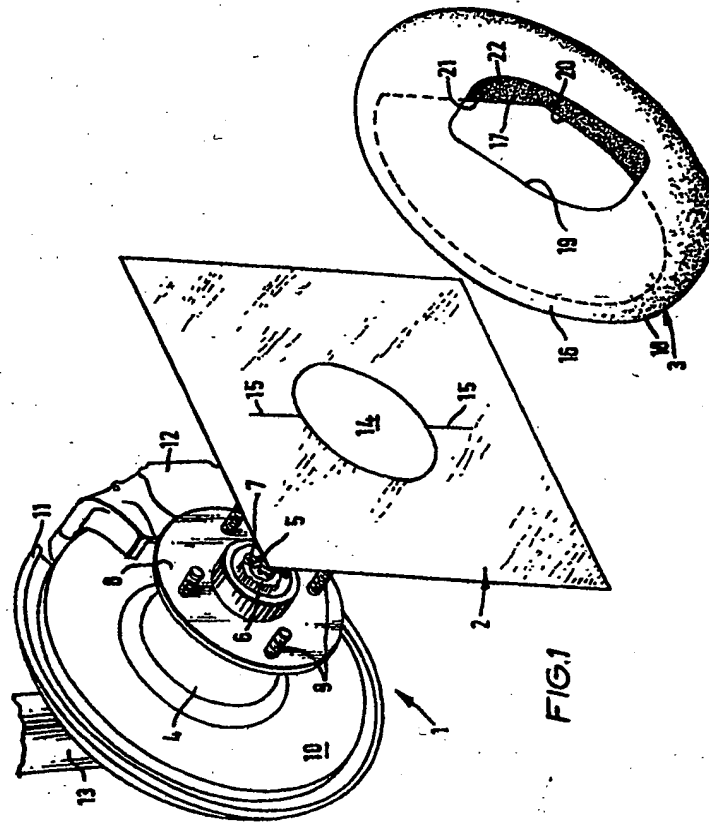
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COMPLETE SPECIFICATION

2 SHEETS

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Sheet 1



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COMPLETE SPECIFICATION

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Sheet 2

